Creative Educational Dance Videos in Mathematics 2

*1Jasmin J Saludares, and 2Eldefonso B Natividad Jr.

*1Department of Education, Schools Division of Ilocos Norte-Saludares-Cali Elementary School, Philippines.

2Department of Education, Schools Division of the City of Batac, Philippines.

Abstract

Learning Mathematics is very challenging for both learners and teachers. Curriculum support materials should be provided to make learning fun among learners and stress-free for teachers. Hence, this study was conducted to develop Creative Educational Dance Videos in Mathematics based on the results of the survey on the level of mastery of learners on the different learning competencies in Mathematics 2 as perceived by their teachers. Following the research and development (R and D) methodology, data were obtained from the 201 Grade 2 public elementary school teachers of the Schools Division of Ilocos Norte. 5 Mathematics teachers expert on content and dance, and 21 key teachers in Grade 2 by utilizing a survey instrument on level of mastery, content validation rating scale, and level of acceptability rating scale. Data gathered were analyzed and interpreted using means with their corresponding descriptive interpretation. Results showed that almost all the learning competencies in Mathematics 2 were rated nearly mastered by the teacher-respondents. This suggested that learners were perceived to have minimum core understanding and skills about the topics on whole numbers and their operations, measurements, geometry, and statistics. Furthermore, it implied the need for the development of the Creative Educational Dance Videos. The outputs evaluation on the content validity and level of acceptability showed that the Creative Educational Dance Videos were very highly valid and very highly acceptable, which implied that the dance videos could be adopted for mathematics instruction to improve learners' performance. It is then recommended that copies of the dance videos be distributed to the teachers for them to use as one of the alternative curriculum support materials in teaching Mathematics 2.

Keywords: Educational dance videos, learning competencies, mathematics, level of mastery, research and development

Introduction

Mathematics is one learning area that pervades life at any age and in any circumstance. Thus, its value goes beyond the classroom and the school. Mathematics as a school subject, therefore, must be learned comprehensively and with much extent. Hence, the twin goals of Mathematics, critical thinking and problem-solving, are to be performed with an organized and rigorous curriculum content, a well-described set of high-level competencies and processes, desirable values and attitudes, and appropriate tools, taking into account the distinctive contexts of Filipino learners (DepEd, 2016) [25].

The quality of education in the country was under the spotlight from the concluding results of both local and international assessments on learners' overall performance which highlighted the low performance of Filipino learners (Gonzales, 2019) [30].

Filipino learners performed lowest among 58 countries in the 2019 Trends in International Mathematics and Science Study (TIMSS). The Philippines only scored 297 in Mathematics, which is significantly lower than the country's achievement in its last participation in 2003, where it scored 358. TIMSS results showed that only 1 percent of Filipino students could apply conceptual understanding to solve problems, 6 percent could apply basic mathematical knowledge in simple situations, and 19 percent had basic mathematical knowledge (Baclig, 2020) [16].

In another assessment, Filipino learners ranked second lowest in Mathematical literacy amongst the 79 participating countries in the 2018 Programme for International Student Assessment (PISA). They performed an average of 353 points which is significantly lower than the Organisation for Economic Co-operation and Development (OECD) average of 489 points. Such performance is classified as below Level 1 proficiency (low performers). At this level, students can demonstrate a low level of skills and knowledge, which is too low to enable them to take part efficiently and productively in everyday life (Gonzales, 2019) [30].

Local data show a dismal pattern of performance. In the 2018 National Achievement Test (NAT) results for Ilocos Norte, six students (0.29%) were highly proficient, 44 (2.15%) proficiency, 307 (14.97%) for nearly proficient, 1317 (64.21%) low proficient and 377 (18.38%) not proficient. These data show that the majority of the learners got low proficiency, which means that they struggle with their understanding and prerequisite and fundamental knowledge and, or skills have not been required or developed adequately to aid understanding.

There are various factors identified in the literature to have affected the low performance. Learners' related factor is the crucial aspect of high failure rate in mathematics (Acharya, 2017) [4]. Learners' related factors include mathematics anxiety, prior knowledge of learners, and learners' labor in learning mathematics. Without students' interest in the teaching-learning activities, there is no possibility to achieve knowledge in the subject matter.

Other factors contributing to poor performance include inadequate teaching/learning material, lack of motivation, and poor attitudes by both teachers and learners (Mbugua *et al.*,

2012) [13]. To address these poor performances as reflected in different assessments, DepEd is focusing on reviewing and updating K to 12 curriculum, improving the learning environment, and upskilling and reskilling teachers (Gonzales, 2019) [30].

Another solution offered in literature is the integration of movement into elementary classrooms. Recent studies show a considerable correlation between cognition and movement. Students learn better the more they are actively moving and participating in physical activity especially in dancing (Duvall, 2018) [26]. It implies that taking movement breaks from cognitive tasks improves learners' learning and attentiveness on academic tasks. Students enter resting states throughout the day, and movement breaks re-energize the students' brains, allowing them to refocus on academic tasks, making dance beneficial for academic success in elementary schools (Tichenor *et al.*, 2017) [7].

Dance can be used to teach the fundamentals of Mathematics and provide students with a basic understanding of the abstract concepts involved. The stigma of Mathematics being sterile and inaccessible will certainly be removed by applying it to more familiar 'real life' circumstances. The mathematics concepts can be used by many choreographers to create dance. The awareness of how Mathematics and dance interact and draw from each other can help understand both areas on a whole new level and keep the inquiry interesting (Wasilewska, 2012) [3].

In connection, the researcher observed from the previous years in teaching Mathematics that most of the learners struggle in their basic mathematical skills. They had difficulty in assimilating the information and in performing the required

skills, most especially in problem solving. They also had a waning interest to learn the topics because of their abstract nature and complexity. Their participation is so minimal that they don't even volunteer when they are asked to do a task.

Since educational videos provide a promising impact on learners' learning based on existing literature, it would then be appropriate to expound these videos with the integration of dance steps. It is for this reason that the researcher wants to develop creative educational dance videos as a remedy to improve the mathematics performance of Grade 2 learners. Delivering the lesson with the integration of dance videos could motivate and engage learners in the teaching-learning process; thereby, improving their level of mastery and academic performance in Mathematics.

Literature Review
The related literature was organized under these themes, namely: the mathematics education framework, quality standards in mathematics education, the performance of learners, educational dance videos, and dance education in Mathematics.

Mathematics Education Framework
Mathematics is an integral part of people's daily lives, and that nobody can go away with it. People need Mathematics in counting, computing sales, gains, and measuring areas and volume, and many more. The need to enhance students' mathematical skills and at the same time develop in them a positive attitude toward the subject is a dire academic need (Kurucz, 2014) [31].

Source: Deped, 2016 [25]

Fig 1: The Conceptual Framework of Mathematics Education

There are five content areas in the Mathematics curriculum, Numbers and Number Sense, Measurement, Geometry, Patterns and Algebra, and Probability and Statistics.

The specific skills and processes to be developed are: knowing and understanding; estimating, computing and

solving; visualizing and modelling; representing and communicating; conjecturing, reasoning, proving and decision-making; and applying and connecting. The following values and attitudes will be honed: accuracy, creativity, objectivity, perseverance, and productivity. It recognizes that

< 180 >

the use of appropriate tools is necessary for teaching mathematics. These include manipulative objects, measuring devices, calculators and computers, smartphones and tablet PCs, and the Internet.

It defines context as a locale, situation, or set of conditions of Filipino learners that may influence their study and use of mathematics to develop critical thinking and problem-solving skills. Contexts refer to beliefs, environment, language, and culture that include traditions and practices, as well as the learner's prior knowledge and experiences.

The framework is supported by the following underlying learning principles and theories: Experiential and Situated Learning, Reflective Learning, Constructivism, Cooperative Learning and Discovery, and Inquiry-based Learning.

The mathematics curriculum is grounded in these theories. Experiential Learning is learning that occurs by making sense of direct everyday experiences. Experiential Learning theory is the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience". Situated Learning is learning in the same context in which concepts and theories are applied. Reflective Learning is learning that is facilitated by reflective thinking. Deeper learning occurs when learners can think about their experiences and process these, allowing them the opportunity to make sense of and derive meaning from their experiences. Constructivism is the theory that argues that knowledge is constructed when the learner can draw ideas from his/her own experiences and connect them to new ideas. Cooperative Learning puts a premium on active learning achieved by working with fellow learners as they all engage in a shared task. The mathematics curriculum allows for students to learn by asking relevant questions and discovering new ideas. Discovery Learning and Inquiry-based Learning support the idea that learners learn when they use personal experiences to discover facts, concepts, and relationships.

Quality Standards in Mathematics Education
In the Philippines, Mathematics is a general education subject in primary and higher education where learners expected to gain understanding and appreciation of its principles as an applied-using appropriate technology in problem-solving, critical thinking, communicating, reasoning, making connections, representations, and decisions in real life (DepEd, 2016) [25].

In the learning essential stage standards in Mathematics 2, the learner demonstrates understanding and appreciation of critical concepts and skills involving numbers and number sense (whole numbers up to 1 000, ordinal numbers up to 20th, money up to PhP100, the four fundamental operations of whole numbers, and unit fractions); geometry (basic shapes, symmetry, and tessellations); patterns and algebra (continuous and repeating patterns and number sentences); measurement (time, length, mass, and capacity); and statistics and probability (tables, pictographs, and outcomes) as applied-using appropriate technology-in critical thinking, problem-solving, reasoning, communicating, making connections, representations, and decisions in real life.

On Grade 2 level standards, the learner demonstrates understanding and appreciation of key concepts and skills involving numbers and number sense (whole numbers up to 1 000, ordinal numbers up to 20th, money up to PhP100, the four fundamental operations of whole numbers, and unit fractions); geometry (basic shapes, symmetry, and tessellations); patterns and algebra (continuous and repeating

patterns and number sentences); measurement (time, length, mass, and capacity); and statistics and probability (tables, pictographs, and outcomes) as applied-using appropriate technology-in critical thinking, problem-solving, reasoning, communicating, making connections, representations, and decisions in real life.

Also, the Grade 2 level content standard expects learners to demonstrate an understanding of whole numbers up to 1000, ordinal numbers up to 20th, and money up to PhP100, the addition of whole numbers up to 1000, including money, subtraction, and multiplication of whole numbers up to 1000 including money, division of whole numbers up to 1000 including money and unit fractions, straight and curved lines, flat and curved surfaces, basic shapes, symmetry in a line, and tessellations using triangles and squares, continuous patterns using two attributes and mathematical sentences involving multiplication and division of whole numbers using 2, 3, 4, 5 and 10 only, and standard measures of length, mass and capacity and area using square-tile units.

Mathematics Performance of Learners
According to Blömeke and Delaney (2014) [17], Mathematics is essential hence required as a subject in almost every field. However, problems related to mathematics achievement are still evident in the Philippine setting learners' performance is still depressing.

Filipino students ranked lowest among 58 countries on the 2019 Trends in International Mathematics and Science Study 2019 (TIMSS). In a study conducted from March until June last 2018, the Philippines scored 297 in mathematics. These scores, compared to other participating countries, are "significantly lower." Nineteen (19%) percent of Filipino students reached the low intermediate benchmark, which indicated that only a few Filipino students "have some basic mathematical knowledge. Students can add, subtract, multiply, divide one-and two-digit whole numbers and can solve simple word problems. Also, students can read and complete simple bar graphs and tables. Only six percent of Filipino students are categorized under the international benchmark, which means students "can apply basic mathematical knowledge in simple situations." And only one percent reached the high benchmark, meaning Filipino students can apply conceptual understanding to solve problems.

In a separate 2019 study by the Southeast Asian Ministers of Education Association (SEAMEO) and the United Nations Children's Fund (UNICEF), only a tiny percentage of grade 5 Filipino children excelled in mathematics, as cited by Baclig (2020) [16].

Moreover, the overall performance of Grade 6 students in the National Achievement Test (NAT) 2018 recorded the lowest performance in the history of the standardized examination with 37.44 MPS which indicates very low mastery. Furthermore, based on the results in the National Achievement Test for Grade 6 S.Y. 2017-2018, the overall MPS was 37.27, which shows that the learners need to improve their mastery and mathematical skills.

Reasons for Poor Performance in Mathematics
The performance in Mathematics has persistently been poor, as shown by different assessments. There are factors related to learners' poor performances in the subject Mathematics: to learners, teachers, and management. For the learners, it involves the attitude towards learning the subject, prior knowledge of the learners, lack of connection between the

< 181 >

subject and learners, short attention span, lack of understanding about signs and symbols, and lack of learner's labor (Acharya, 2017) [4].

Teachers also contributed to the poor performance in Mathematics, including the teaching methods, teaching-learning materials, and effectiveness of Mathematics teachers in teaching, teacher's attitude towards Mathematics, teachers' workload, and teachers' remedial lessons (Mbugua *et al*., 2012) [13].

Moreover, the educational system or the management also contributes to poor performance due to the teacher-student ratio, the availability of textbooks, and other learning resources that can be used by the learners (Edsys, 2018) [29].

Educational Dance Videos

Mathematics needs to be fun and engaging. According to Colgan (2014) [22], many students find mathematics "boring, mostly irrelevant and unrewarding." So, Educators should strive to use resources and strategies that capture student interest and spike motivation. This includes the use of: use physical movements in the classroom to act the mathematics, TV programs/videos, educational apps, Math games, stories, and books that incorporate mathematics and Math busking', using street performing to learn about math.

Using audio-visual materials in the classroom is nothing new. Educators have recognized the power of audio-visual materials to capture learners' attention, increase their motivation and enhance their learning experience since filmstrip was first studied during World War II as a training tool for soldiers (Hovland *et al*., 2017) [2].

Both the content and the technology have developed considerably, increasing the availability and the value of audio and video materials in classrooms. Content has developed from instructional television (ITV) of the 1950s and 1960s, which allowed replay of taped lectures, through educational television (ETV), intended to complement classroom instruction rather than compete with it to educational standards-based videos designed specifically as additional classroom tools (Corporation for Public 2 Broadcasting, 2014) [24].

According to a series of studies conducted by Corporation for Public Broadcasting (2010), the use of educational video and television in classrooms has risen steadily over the past 20 to 30 years. The most significant finding of these studies that supports the value of these multimedia tools is the direct relationship between frequency of use and perceived student achievement and motivation. Among frequent users (teachers who report using TV or video for two or more hours per week), two-thirds find that students learn more when TV or video is used, and close to 70% find that student motivation increases. More than half of frequent users also find that students use new vocabulary due to video use. These findings have helped the researcher identify the need to provide multimedia material that will help teachers and students become more motivated in their own tasks in the teaching and learning process.

Benefits of Using Video in Education

According to Brown (2020) [20], the following are the benefits of using video in the classroom: memorable and comprehensive, videos paired with text-on-screen offers a higher degree of visualization wherein it easier for the brains to comprehend and remember a message; affordable, plenty of offline and online educational videos are available to show

during class; video content is accessible, videos are portable which offers an incredible level of flexibility to both teachers and learners; video content is customizable, which creates personalized learning experiences, allowing the individual to learn at their own pace; and, using video education promotes engagement which makes children connect faster.

Through educational videos, learners are also benefited to build confidence in new and familiar math concepts, express their creativity and problem-solving through movement, boost social skills and improve teamwork, practice mindfulness through dance, and engage with education in fun and creative ways they will be eager to share with parents and peers.

Meanwhile, teachers also acquire benefits using videos in the classroom just like the following: videos are easier to be accepted by students, immerse students in the production, stimulate activities, the video brings more information, engage learners, and integrate the outside world into the classroom. Considering the use of videos in the classroom, teachers can obtain more immersive, meaningful, and better learning experiences.

Dance Education in Mathematics

The arts offer many benefits to students, and integrating the arts into the classroom has proven effective (Redman 2016) [33]. Furthermore, dance, as one of the arts, also offers students many opportunities to develop and enhance skills needed for life. One significant benefit of dance is the ability to integrate it into other academic subjects such as Mathematics.

Integrating dance education, students will be exposed to a new form of movement and kinesthetic learning and learning new ways to connect learners' prior knowledge to the concepts to be studied (Duvall, 2018) [26]. Integrated dance curriculaare essential, especially on the elementary level, to provide learners with physical activity, deeper thinking, creativity, collaboration, and new ways of thinking about the concepts and connections to what learners already know. Both physical and academics coinciding helps learners' increase retention and success.

Materials and Methods
Research and Design

This study utilized the research and development (R and D) methodology, which is defined by Anggraini (2015) [9] as a process designed to develop and validate pedagogical materials (e.g., teaching resource material, training programs) so that they can be made available in a vast area. R and D was chosen for this study since it intended to develop educational dance videos to improve the teaching-learning process.

R and D involve the following stages: Planning stage, Development stage, and Validation stage.

Population and Sample

The population of this study was the 404 public elementary school teachers handling Grade 2 in the Schools Division of Ilocos Norte. By Slovin's Formula and stratified random sampling, only 201 teachers were considered as samples. Such a number is equivalent to a sampling percentage of 49.75%. Moreover, the study tapped five mathematics teachers, who are experts on content and dance to validate the dance videos. And, twenty-one key mathematics teachers in Grade 2, one from each district, were tasked to evaluate the level of acceptability of the Creative Educational Dance Videos in Mathematics 2.

< 182 >

Table 1: Distribution of Grade 2 teacher-respondents in the public elementary schools of the Schools Division of Ilocos Norte

Zone/District	N	n
Central Zone		
1. Bacarra I	13	7
2. Bacarra II	15	8
3. San Nicolas	27	13
4. Sarrat	22	11
5. Vintar I	22	11
6. Vintar II	19	10
Sub-total	118	60
East Zone		
7. Banna	19	10
8. Dingras I	21	10
9. Dingras II	15	8
10. Marcos	14	7
11. Nueva Era	10	5
12. Piddig-Carasi	21	10
13. Solsona	19	10
Sub-total	119	60
North Zone		
14. Bangui	18	9
15. Burgos	11	5
16. Pagudpud	28	14
17. Pasuquin	27	13
Sub-total	84	41
South Zone		
18. Badoc	27	13
19. Currimao	11	5
20. Paoay	23	11
21. Pinili	22	11
Sub-total	83	40
Total	404	201

Instruments

Three sets of data gathering tool were used for this study, namely: level of mastery questionnaire on the Most Essential Learning Competency (MELCs); content validation rating adopted from the Guidelines and Processes for LRMDS Assessment; and level of acceptability adopted from Ballesteros (2021) [11].

Level of Mastery Questionnaire on MELCs: This was the primary data gathering tool of the study, which included the learning competencies based on MELCs Quarter 1 to Quarter 4. This rating scale tool was used to gather data on the level of mastery of Grade 2 learners on the Most Essential Learning Competencies in Mathematics. The indicators were lifted from the curriculum guide issued by DepEd in 2020. This tool utilized a three-point Likert type scale, with 1, the lowest, as least mastered, and 3, the highest, as mastered. An open ended question every quarter as regards reasons of low mastery was also included in the instrument.

The level of mastery of learners on the learning competencies was analyzed and interpreted using the following range of means.

Range of Means	Descriptive Interpretation
2.51-3.00	Mastered (M)
1.51-2.50	Nearly Mastered (NM)
1.00-1.50	Least Mastered (LM)

Content Validation Rating Scale: This tool was used to determine the content validity of the Creative Educational Dance Videos in Mathematics 2 along with instructional design and presentation and organization, accuracy and timeliness of information, language, and technical design. The indicators were adopted from the evaluation instrument of DepEd for television lessons. However, the response rating of the Yes or No was modified into a 5-point Likert-type scale to fit into the objective of the study. The highest rating of 5 is rated *Very Highly Valid*, while the lowest rating of 1 is equivalent to *Not Valid.*

The level of agreement in the survey was interpreted in terms of level of validity. Hence, the range of means with their corresponding descriptive interpretations were used as follows:

< 183 >

Range of Means	Descriptive Interpretation
4.51-5.00	Very Highly Valid (VHV)
3.51-4.50	Highly Valid (HV)
2.51-3.50	Moderately Valid (MV)
2.00-2.50	Slightly Valid (SV)
1.00-1.50	Not Valid (NV)

Level of Acceptability Rating Scale: This tool, adopted from Ballesteros (2021) [11], elicited the level of acceptability of the material as to clarity, execution, usefulness, language and style, and suitability. Indicators on clarity, usefulness, language and style, and suitability. Since the output is a dance video, the researcher included another criterion on execution. The indicators on execution were formulated based on readings of internet sources, books, journals, and the like. The tool was answered using a 5-point Likert-type scale with 5 as *Very Highly Acceptable* and 1 as *Not Acceptable*.

The level of acceptability of the Creative Educational Dance Videos in Mathematics 2 was analyzed and interpreted using the range of means with their corresponding descriptive interpretation as follows:

Range of Means	Descriptive Interpretation
4.51-5.00	Very Highly Acceptable (VHA)
3.51-4.50	Highly Acceptable (HA)
2.51-3.50	Moderately Acceptable (MA)
2.00-2.50	Slightly Acceptable (SA)
1.00-1.50	Not Acceptable (NA)

Data Gathering Procedure
The study involved the three basic stages: Planning Stage, Development Stage, and Validation Stage.

Planning Stage. This stage included two phases: bibliographical research of related literature and studies to determine learners' performance in Mathematics and benefits of educational videos in the educational system, which served as a springboard in identifying possible thematic concerns that need to be addressed; and the analysis of survey results. Based on the results of the survey, the researcher identified the competencies that were needed in the development of the Creative Educational Dance Videos in Mathematics 2. The learning competencies which received the lowest guy five mean ratings per quarter were considered. Hence, 22 dance videos were made.

Development Stage**.** This stage focused on the development of the dance videos. The researcher included the following parts of the educational dance videos: demonstration of steps, discussion of the connection of each step to the learning competencies, showcase of the steps with the use of an appropriate music, and illustration of the concepts with example.

Validation Stage. In this stage, the material was validated by five Mathematics teachers who are both experts on content and dance. Also, the level of acceptability of the material was evaluated by 21 key teachers in Mathematics 2. Comments and suggestions served as bases in enriching the content and activities in the videos for the production of the Creative Educational Dance Videos in Mathematics 2.

Data Analysis
Mean was utilized in determining the level of mastery of the learners in Mathematics 2 on the Most Essential Learning Competencies (MELCs).

The level of mastery of the Mathematics 2 learners was analyzed and interpreted using the following range of means with the corresponding descriptive interpretations:

Range of Means	Descriptive Interpretation
2.51-3.00	Mastered (M)
1.51-2.50	Nearly Mastered (NM)
1.00-1.50	Least Mastered (LM)

Mean was also used to describe the content validity of the Creative Educational Dance Videos in Mathematics 2 in terms of instructional design and presentation and organization, accuracy and timeliness of information, language, and technical design. The level of agreement in the survey was interpreted in terms of level of validity. Hence, the range of means with their corresponding descriptive interpretations were used as follows:

Range of Means	Descriptive Interpretation
4.51-5.00	Very Highly Valid (VHV)
3.51-4.50	Highly Valid (HV)
2.51-3.50	Moderately Valid (MV)
2.00-2.50	Slightly Valid (SV)
1.00-1.50	Not Valid (NV)

Furthermore, mean was also used to determine the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 in terms of clarity, execution, usefulness, language and style, and suitability. This was analyzed and interpreted using the range of means with their corresponding descriptive interpretation as follows:

Range of Means	Descriptive Interpretation
4.51-5.00	Very Highly Acceptable (VHA)
3.51-4.50	Highly Acceptable (HA)
2.51-3.50	Moderately Acceptable (MA)
2.00-2.50	Slightly Acceptable (SA)
1.00-1.50	Not Acceptable (NA)

Results and Discussion
Results
The level of mastery of Grade 2 learners on the learning competencies in Mathematics from first quarter to fourth quarter as perceived by the teacher-respondents. The results are presented separately in Tables 2a to 2d.

Teachers' perceptions on learners' level of mastery in Mathematics 2 in Quarter 1 Quarter 1 covers topics that allow learners to demonstrate understanding of whole numbers up to 1000, numbers up to 20th, money up to PhP100, and addition of whole numbers up to 1000 including money. Table 2a presents the level of mastery of learners on these topics as perceived by the teacher-respondents.

The respondents believed that Grade 2 learners *nearly* mastered the learning competencies in Quarter 1 as shown by the composite of 2.47. This means that the learners had a minimum knowledge and skills and core understandings about whole numbers and money. They find themselves in need of help to be able to perform the mathematical activities related to the different learning competencies in Quarter 1.

As explained by Louange *et al*. (2010) [5], the learners understand the words and calculations to be made but they do not know which of the calculation they should perform. Learners don't always understand what the numbers and what to do with the numbers. According to Visitacion (2017) [14], additional resources could be prepared especially in the form of activities for supplementing and enriching the teaching and learning process. In addition, Looking at the specific details of the table, it appeared that learners recorded eight out of 18 learning competencies within the *mastered* level with means ranging from 2.51 to 2.74. This indicates that learners are

< 184 >

already able to recognize, represent, compare, and order whole numbers, ordinal numbers, and money.

Table 2a: Teachers' perceptions' on the level of mastery of Grade 2 learners in Quarter 1. (n = 201)

Most Essential Learning Competency	Mean	Descriptive Interpretation
1. Visualizes and represents numbers from 0-1000 with emphasis on numbers 101-1 000 using a variety of materials.	2.70	M
2. Gives the place value and finds the value of a digit in three-digit numbers.	2.61	M
3. Visualizes and counts numbers by 10s, 50s, and 100s.	2.74	M
4. Reads and writes numbers up to 1 000 in symbols and in words.	2.34	NM
5. Visualizes and write three-digit numbers in expanded form.	2.55	M
6. Compares numbers up using relation symbols and orders numbers up to 1 000 in increasing or decreasing order.	2.59	M
7. Identifies, reads and writes ordinal numbers from 1st through the 20th object in a given set from a given point of reference.	2.56	M
8. Reads and writes money in symbols and in words through PhP100.	2.32	NM
9. Counts the value of a set of bills or a set of coins through PhP100 (peso-coins only; centavo-coins only; peso-bills only and combined peso-coins and peso bills).	2.47	NM
10. Compares values of different denominations of coins and paper bills through PhP100 using relation symbols.	2.54	M
11. Illustrates the properties of addition (commutative, associative, identity) and applies each in appropriate and relevant situations.	2.31	NM

12. Visualizes, represents, and adds the following numbers with sums up to 1000 without and with regrouping:
    a. 2-digit by 3-digit numbers
    b. 3-digit by 3-digit numbers
	2.46
	2.51
		NM
		M

13. Adds mentally the following numbers using appropriate strategies:
    a. 1-to 2-digit numbers with sums up to 50
    b. 3-digit numbers and 1-digit numbers
    c. three –digit numbers and tens (multiples of 10 up to 90)
    d. 3-digit numbers and hundreds (multiples of 100 up to 900)
	2.47
	2.49
	2.38
	2.29
		NM
		NM
		NM
		NM

14. Solves routine and non-routine problems involving addition of whole numbers including money with sums up to 1000 using appropriate problem solving strategies and tools.	2.08	NM
Composite Mean	2.47	NM

Legend

Range of Means	Descriptive Interpretation
2.51-3.00	Mastered (M)
1.51-2.50	Nearly Mastered (NM)
1.00-1.50	Least Mastered (LM)

Specifically, the highest mean rating of 2.74 was obtained along learning competency that involves visualization and counting of numbers by 10s, 50s, and 100s. It is followed by visualizing and representing numbers from 0-1000 with emphasis on numbers 101-1 000 using a variety of materials (M=2.70) and by giving the place value and finding the value of a digit in three-digit numbers (M=2.61). These results suggest that learners had already gained mathematical skill involved in skip counting, representing numbers, and understanding place value of digits.

In contrast, ten of the learning competencies were rated nearly mastered with mean ratings ranging from 2.08 to 2.49. These ratings imply that the learners have acquired the prerequisite knowledge but might still struggle to perform more advanced and complex operations about whole numbers, ordinal numbers, and money values. Hence, assistance from their teachers would be necessary and instructional support materials could be needed to facilitate the learning process.

of these ten nearly mastered learning competencies, the lowest rating was given along solves routine and non-routine problems involving addition of whole numbers including money with sums up to 1000 using appropriate problem-solving strategies and tools (M=2.08). This goes to show that learners still had difficulty performing word problems involving addition of whole numbers including money. This further means that learners could not fully make meaningful connections of the concepts and their application to real-life situations through the simulated activities in the classroom.

This findings corroborate with Bartolome (2019) [12] where she found out that concepts in Math seem to be confusing because of the difficulty to interpret the terms in relation to word problem.

The learning competencies, adds mentally 3-digit numbers and hundreds (multiples of 100 up to 900) (M = 2.29) and illustrates the properties of addition (commutative, associative, identity) and applies each in appropriate and relevant situations (M = 2.31), were also rated nearly mastered. These findings suggest that learners had acquired the fundamental understanding of adding 3-digit numbers and illustrating the properties of addition, however, such understanding could still be inadequate for moving towards achieving better critical thinking and problem-solving skills.

These findings could be substantiated further by the statements of the teacher-respondents as regards the reasons for having only nearly mastered some of the learning competencies. They claimed that lack of follow-up at home by the parents, poor motivation, limited time to deepen understanding, lack of mastery of previous learning, lack of focus, and unfamiliarity of mathematical terms could contribute to their performance. These are evident by the statements of the respondents below:

Lack of time, sometimes no follow at home.

-Respondent 5

< 185 >

The pupils are not totally motivated in the lesson. That's why teachers do everything in order to get the attention of the pupil.

-Respondent 10

Learners lack interest in learning at home.

-Respondent 16

It maybe that they cannot yet master their multiplication table.

-Respondent 28

Some learners had no focus on their lessons.

-Respondent 40

They cannot fully understand the terms used in problem-solving.

-Respondent 52

Teachers' Perceptions on Learners' Level of Mastery in Mathematics 2 in Quarter 2

Quarter 2 includes topics that lead learners to have a deeper comprehension on subtraction and multiplication of whole numbers up to 1000 including money in mathematical problems and real-life situations that are applicable and suitable to everyday management. Table 2b presents the learners' level of mastery on Quarter 2 as perceived by the teacher-respondents.

As it can be viewed from the table, Grade 2 learners *nearly mastered* the learning competencies in Quarter 2 as shown by the composite mean of 2.28. This result suggests that they cannot fully demonstrate yet with independence the necessary skill on subtraction and multiplication of whole numbers and money. Furthermore, it implies the need for the production of curriculum support material to usher them in achieving the mathematical skills required in the curriculum for Quarter 2.

Table 2b: Teachers' perceptions on the level of mastery Grade 2 learners in Quarter 2. (n = 201)

Most Essential Learning Competency	Mean	Descriptive Interpretation
1. Visualizes, represents, and subtracts 2-to 3 digit numbers with minuends up to 999 without and with regrouping.	2.48	NM
2. Subtracts mentally the following numbers without regrouping using appropriate strategies: a. 1-digit numbers from 1-to 3-digit numbers b. 3-digit numbers by tens and by hundreds	2.43 2.49	NM NM
3. Solves routine and non-routine problems involving subtraction of whole numbers including money with minuends up to 1000 using appropriate problem solving strategies and tools.	2.12	NM
4. Performs orders of operations involving addition and subtractions of small numbers.	2.41	NM
5. Solves multi-step routine and non-routine problems involving addition and subtraction of 2-to 3-digit numbers including money using appropriate problem solving strategies and tools.	2.05	NM
6. Illustrates and writes a related equation for each type of multiplication: repeated addition, array, counting by multiples, and equal jumps on the number line.	2.24	NM
7. Illustrates the following properties of multiplication and apply each in relevant situation: (a) identity, (b) zero, and, (c) commutative.	2.22	NM
8. Visualizes multiplication of numbers 1 to 10 by 2,3,4,5 and10.	2.41	NM
9. Multiplies mentally 2,3,4,5 and 10 using appropriate strategies.	2.27	NM
10. Solves routine and non-routine problems using appropriate problem solving strategies and tools: a. Multiplication of whole numbers including money	2.05	NM
b. Multiplication and addition or subtraction of whole numbers including money.	2.16	NM
Composite Mean	2.28	NM

Legend

Range of Means	Descriptive Interpretation
2.51-3.00	Mastered (M)
1.51-2.50	Nearly Mastered (NM)
1.00-1.50	Least Mastered (LM)

Taking individually the learning competencies, it appears that all of them registered a rating of nearly mastered with equivalent mean ratings of 2.09 to 2.49. These ratings imply that the learners are still somewhat weak in performing the required skills to perform more advanced or complex operations on whole numbers and money. They need instructional support to be able to visualize and represent 3-digit whole numbers, and to solve routine and non-routine word problems involving these numbers and money.

Of these 12 nearly mastered learning competencies, it is evident that the lowest ratings were obtained on competencies that relate to problem-solving skills involving addition and subtraction of 2-to 3-digit numbers (M = 2.05), multiplication of whole numbers including money (M = 2.05, subtraction of whole numbers including money with minuends up to 1000 using appropriate problem solving strategies and tools

(M=2.12), and multiplication and addition of whole numbers including money (M=2.16).

These findings mean that learners had the minimum knowledge and skills and core understanding in making meaningful connections of the mathematical concepts involving addition, subtraction, and multiplication of three to four digit numbers including money and their applications to real-life situations. Such a condition implies the need to develop instructional material that could help learners advance their competencies in translating mathematical principles into their own life's experiences.

According to Bacnat (2020) [10], developing a material based on the prescribed learning competencies of the K to 12 Mathematics curriculum helps to improve learners' understanding of concepts and acquisition of skills. This proves that if learners do not possess the requisite mathematical knowledge, they had difficulty interpreting keywords appearing in problems into mathematical sentence and were unable to figure out what to assume and what information from the problem is necessary to solving it (Phonapichat *et al.*, 2014) [6].

< 186 >

The learning competencies, illustrate the following properties of multiplication and apply each in relevant situation: identity, zero and commutative (M=2.22), and illustrates and writes related equation for each type of multiplication: repeated addition, array counting by multiples and equal jumps on the number line (M=2.24), were also rated nearly mastered. These revealed that learners have not fully developed the basic foundation of understanding and illustrating the properties of multiplication and writing related equations for each type of multiplication. Hence, they could not perform authentic tasks required in the curriculum independently. As such, they could benefit much from the use of alternative instructional resources in the teaching and learning process.

As claimed by the teacher-respondents, learners had nearly mastered the learning competencies due to some reasons like poor attitude toward learning, lack of comprehension on word problems, inadequate time to teach the competencies, and difficulty in reading.

Lazy to read and solve problems.

-Respondent 39

Most of the pupils can't understand problem solving.

-Respondent 43

Learners achieved nearly mastered because those competencies were not adequately taught.

-Respondent 45

They are hard up in reading and analyzing questions.

-Respondent 49

Teachers' Perceptions on Learners' Level of Mastery in Mathematics 2 in Quarter 3

For Quarter 3, the learners are expected to demonstrate understanding of division of whole numbers up to 1000 including money; unit fractions in various forms and contexts; straight and curved lines, flat and curved surfaces, basic shapes and create simple designs that show symmetry in a line and tessellation using triangles and squares; and continuous patterns using two attributes. Table 2c shows the level of mastery of learners on these topics as perceived by the teacher-respondents.

The table displays that the Grade 2 learners nearly mastered the competencies in Quarter 3 as manifested by the composite mean of 2.31. It can be inferred that the learners had the prerequisite and fundamental knowledge to perform cognitive operations on acts and information for the purpose of constructing enduring ideas, principles, and generalizations. However, they could still struggle to do authentic performance tasks involving division of whole numbers, unit fractions, and basic shapes without assistance from the teachers or from More Knowledgeable Others (MKO).

Table 2c: Teacher' Perceptions on the Level of Mastery Grade 2 Learners in Quarter 3. (n = 201)

Most Essential Learning Competency	Mean	Descriptive Interpretation
1. Visualizes and represents division, and writes a related equation for each type of situation: equal sharing, repeated subtraction, equal jumps on the number line, and formation of equal groups of objects.	2.35	NM
2. Visualizes division of numbers up to 100 by 2,3,4,5, and 10 (multiplication table of 2, 3, 4, 5 and 10).	2.27	NM
3. Divides mentally numbers by 2,3,4,5 and 10 using appropriate strategies (multiplication table of 2, 3, 4, 5 and 10).	2.17	NM
4. Illustrates that multiplication and division are inverse operations.	2.32	NM
5. Solves routine and non-routine problems involving division of numbers by 2,3,4,5 and 10 and with any of the other operations of whole numbers including money using appropriate problem solving strategies and tools.	2.00	NM
6. Visualizes, represents and identifies unit fractions with denominators of 10 and below.	2.35	NM
7. Reads and write unit fractions	2.40	NM
8. Compares using relation symbol and arranges in increasing or decreasing order the unit fractions.	2.22	NM
9. Identifies other fractions less than one with denominators 10 and below.	2.29	NM
10. Visualizes (using group of objects and number line), reads and writes similar fractions	2.36	NM
11. Compares similar fractions using relation symbols.	2.40	NM
12. Arranges similar fractions in increasing or decreasing order.	2.29	NM
13. Constructs squares, rectangles, triangles, circles, half circles, and quarter circles using cut-outs and square grids.	2.47	NM
14. Identifies straight lines and curves, flat and curved surfaces in a 3-dimensional object	2.46	NM
15. Determines the missing term/s in a given continuous pattern using two attributes (any two of the following: figures, numbers, colors, sizes, and orientations, etc.) e.g. 1, A, 2,B,3,C,	2.34	NM
Composite Mean	2.31	NM

Legend

Range of Means	Descriptive Interpretation
2.51-3.00	Mastered (M)
1.51-2.50	Nearly Mastered (NM)
1.00-1.50	Least Mastered (LM)

Looking at the individual ratings of the competencies, it appeared that learners only had *nearly mastered* level in all of them with means ranging from 2.00 to 2.47. Of these fifteen nearly mastered learning competencies, the lowest rating was obtained along solving routine and non-routine problems involving division of numbers by 2, 3, 4, 5 and 10 and with any other operations of whole numbers including money using appropriate problem solving strategies and tools (M = 2.00). This manifests that learners could solve word problems involving division of whole numbers including money with some assistance from their teachers as they still had difficulty

< 187 >

transferring these factual and procedural mathematical understanding to applications in real-life situations. Hence, there could be a need to provide additional support to ensure that learners could practice their thought processes in planning and carrying out strategies in problem solving.

Bartolome (2019) [12] stated that teachers should provide positive reinforcement to help the learners master the concept or skill especially so that they are needed in solving word problems. Teachers should develop an enrichment or reinforcement learning material that learners can work on independently to enhance their mathematical word problem skills. Furthermore, as explained by Adipo (2015) [8], instructional materials impact students' achievement. In fact, when children are taught by the use of instructional materials, performance in Mathematics is improved.

It can also be observed that the other lowest competencies were registered along the items, divides mentally numbers by 2, 3, 4, 5 and 10 using appropriate strategies (multiplication table of 2,3,4,5 and 10) (M=2.17), and visualizes division of numbers up to 100 by 2,3,4,5 and 10 (multiplication table of 2, 3, 4, 5 and 10) (M = 2.27). These findings suggest that learners could have acquired substantive content on mental division and visualization of division of numbers but such understanding remains inadequate for independent learning. Hence, the assistance of parents and teachers would still be necessary.

According to the teacher-respondents, the nearly mastered level in all the learning competencies could be attributed to lack of eagerness to learn, insufficient practice exercises provided, inadequate mastery of prerequisite skills, and weak assistance from parents for home learning. These reasons are evident from these statements of the respondents:

They don't have the eagerness to study.

-Respondent 199

Some pupils need guidance and more exercises to achieve mastery in their studies in Mathematics.

-Respondent 182

Sub competency is not mastered. There is confusion with fractions.

-Respondent 167

Some parents cannot always assist their children at home.

-Respondent 163

Teachers' perceptions on learners' level of mastery in Mathematics 2 in Quarter 4

Quarter 4 covers topics that allow learners to apply knowledge of time, standard measures of length, weight, and capacity, and area in mathematical problems and real-life situations, and to interpret simple representations of data (pictographs without and with scales). Table 2d shows the level of mastery of learners on these topics based on the perception of the teacher-respondents.

Table 2d: Teacher' perceptions on the level of mastery Grade 2 learners in Quarter 3. (n = 201)

Most Essential Learning Competency	Mean	Descriptive Interpretation
1. Tellsand writes time in minutes including a.m. and p.m. using analog and digital clocks.	2.44	NM
2. Visualizes, represents, and solves problems involving time (minutes including a.m. and p.m. and elapsed time in days).	2.08	NM

3. Compares the following unit of measures:
   a. length in meters or centimeters
   b. mass in grams or kilograms
   c. capacity in mL or L
	2.29
	2.36
	2.32
		NM
		NM
		NM

4. Measures objects using appropriate measuring tools and unit of length in m or cm.	2.29	NM
5. Estimates and measures length using meter or centimetre.	2.23	NM
6. Solves routine and non-routine problems involving length.	2.02	NM
7. Measures objects using appropriate measuring tools and measuring units in g or kg.	2.33	NM
8. Estimates and measures mass using gram or kilogram.	2.25	NM
9. Solves routine and non-routine problems involving mass.	2.03	NM
10. Measures objects using appropriate measuring tools in mL or L.	2.26	NM
11. Finds the area of a given figure using square-tile units i.e. number of square-tiles needed.	2.18	NM
12. Estimates the area of a given figure using any shape.	2.11	NM
13. Solves routine and non-routine problems involving any figure using square tiles.	2.05	NM
14. Infers and interprets data presented in a pictograph without and with scales.	2.23	NM
15. Solves routine and non-routine problems using data presented in a pictograph without and with scales.	2.06	NM
Composite Mean	2.21	NM

Legend

Range of Means	Descriptive Interpretation
2.51-3.00	Mastered (M)
1.51-2.50	Nearly Mastered (NM)
1.00-1.50	Least Mastered (LM)

The respondents rated the Grade 2 learners with a nearly mastered level in all the learning competencies. This is supported by the individual mean ratings of 2.02 to 2.44 and a composite mean rating of 2.21. It appears from these results that the learners had a satisfactory performance in all the learning competencies. The learners are to demonstrate minimum understanding and skills about time, measurements and data interpretation. However, they could be quite struggling to employ higher order thinking skills, especially in solving routine and non-routine problems. Hence, this calls for the need of additional support materials that could help

< 188 >

them apply mathematical concepts and procedures to more advanced and complex learning activities.

As shown by the table, the lowest ratings were given along with items on solving routine and non-routine problems involving length (M=2.02), mass (M=2.03), any figure using square tiles (M=2.05), and data presented in a pictograph without and with scales (M = 2.06). This indicates that learners had limited skills in solving different types of word problems related to measurement and statistics. They had minimum understanding about factual knowledge on length, mass, figures, pictograph, and other related concepts but had difficulty translating them successfully and independently in solving routine and non-routine problems.

Ali (2019) [15] stated that the reasons for the students' difficulty in solving word problems are lack of understanding of basic concepts, lack of practice, short span of focus and teaching method. Teachers should use some techniques that is easy to understand or more procedural so that students can grab the concepts step by step like using visual methods to elaborate on problems.

Furthermore, the learning competency involving time was given a rating of nearly mastered. This means that learners had not fully developed the skills to visualize, represent, and solve problems involving time. They could only make sense of the facts and information about time in more advanced undertakings with the guidance from the teachers or parents.

Reasons about this nearly mastered level of performance about Quarter 4 could be extracted from the responses of the teachers in the open-ended question survey. It appears that the teachers attribute this performance to low comprehension, unavailability of materials to use at home, difficulty in conversion of measurement, and inappropriateness of the learning competency to learner's maturity.

Pupils have low comprehension in solving word problems.

-Respondent 182

No available materials to use at home like kilo, meter sticks, etc.

-Respondent 200

Usually, pupils are hard up in converting units of measurements.

-Respondent 100

Some of the competencies in Quarter 4 are too high for the learners. They are inappropriate for their age.

-Respondent 5

Summary of results on teachers' perceptions on the level of mastery Grade 2 learners in Mathematics

Table 2e summarizes the results of the teachers' perceptions on the level of mastery of Grade 2 learners in Mathematics in all the quarters. The composite mean ratings from 2.21 to 2.47 clearly indicate that the learners nearly mastered the learning competencies in Mathematics 2. This finding suggests that

they are equipped with minimum understanding and core skills about whole numbers and their operations, measurements, geometry, and statistics. They could advance their learning in Mathematics with the assistance from their teachers and parents.

The overall mean of 2.32 discloses that, on the whole, the learners nearly mastered the topics in Mathematics 2. This result could mean the need for alternative curriculum support material in the teaching and learning process. Hence, the use of videos could be explored to enhance the critical thinking and problem solving skills of the learners.

Table 2e: Summary of results of the teachers' perceptions on the level of mastery Grade 2 learners in Mathematics. (n = 201)

Quarter	Composite Mean	Descriptive Interpretation
1. Quarter 1	2.47	NM
2. Quarter 2	2.28	NM
3. Quarter 3	2.31	NM
4. Quarter 4	2.21	NM
Overall Mean	2.32	NM

Legend

Range of Means	Descriptive Interpretation
2.51-3.00	Mastered (M)
1.51-2.50	Nearly Mastered (NM)
1.00-1.50	Least Mastered (LM)

Panel of Experts Evaluation on the Content Validity of the Creative Educational Dance Videos in Mathematics 2 in Terms of Instructional Design and Presentation and Organization

Table 3a shows the evaluation of a panel of experts to the various indicators along with the instructional design and presentation and organization of the material as shown by the computed weighted mean which constitutes the set of values ranging from 4.40 to 5.00 with the descriptive interpretation of *Highly Valid* and *Very Highly Valid* respectively. Moreover, it has a composite mean score of 4.73, described as *Very Highly Valid*, which implies that the materials' instructional design and presentation and organization are valid.

This means that the materials complied with the different criterion for validity that deals with the suitability, appropriateness, compliance of contents to learners' level of development, learning goals and objectives, thinking skills, values and traits. It also involves presentation and organization of concepts to include motivational strategies and opportunities to practice.

The obtained result supports what Hovland *et al.* (2017) [2] asserted that using audio-visual materials in the classroom can capture learners' attention, increase their motivation, and enhance their learning experience.

Table 3a: Panel of experts' evaluation on the content validity of the Creative Educational Dance Videos in Mathematics 2 in terms of instructional design and presentation and organization. (n = 5)

Indicator	Mean	Descriptive Interpretation
1. The content of the video/TV lesson is suitable to the learner's level of development.	5.00	VHV
2. The content of the video/TV lesson record is logically presented and organized.	4.80	VHV
3. The video/TV lesson record discusses one topic/lesson only.	5.00	VHV
4. The content of the video/TV recording provides and communicates clear learning goals.	4.80	VHV
5. The contents and activities within the video/TV record facilitates achievement of objective/objectives.	4.80	VHV
6. The content is compliant to the social guidelines.	4.60	VHV

< 189 >

7. The content develops learners 21st Century and/or higher order thinking skills.	4.40	HV
8. The content enhances the development of any desirable value/s and trait/s.	4.40	HV
9. The content allows for review, comparison, and integration with previous lessons.	4.40	HV
10. Motivational strategies are provided.	4.80	VHV
11. Content is designed using strategies to helps pupil learn the information and skills that are in focus.	4.80	VHV
12. Content provides opportunity for practice and deepening skills/competency.	5.00	VHV
Composite Mean	4.73	VHV

Legend

Range of Means	Descriptive Interpretation
4.51-5.00	Very Highly Valid (VHV)
3.51-4.50	Highly Valid (HV)
2.51-3.50	Moderately Valid (MV)
2.00-2.50	Slightly Valid (SV)
1.00-1.50	Not Valid (NV)

Panel of Experts' Evaluation on the Content Validity of the Creative Educational Dance Videos in Mathematics 2 in Terms of Accuracy and Timeliness of Information

Table 3b presents the evaluation done by the panel of experts along the accuracy and timeliness of information of the material.

The data shown in the table reveals the validators' positive evaluation on the accuracy and timeliness of information of the material as evidenced by the obtained weighted mean scores which constitute the set of values ranging 4.60-5.00 with the descriptive interpretation of Very Highly Valid.

Moreover, it has a composite mean of 4.87 described as Very Highly Valid which indicates that the materials concentrate on the accuracy of the script along concepts, facts, grammar, computation, information, and typography.

Fernandez and Martinez (2011) [19] asserted that teachers' work should focus on developing scripts which is the result of a creative effort. At the time of preparing the scripts the following points should be decided upon what to explain, how the videos will be used and how long.

Chinwendu (2014) explained that updated, correct concepts and grammar, and accurate facts contained in the teaching materials if showcased, would make students become academically and more engaged in their learning materials as manifested by their willingness to learn.

Table 3b: Panel of experts' evaluation of the Creative Educational Dance Videos in Mathematics 2 in terms of accuracy and timeliness of information. (n = 5)

Indicator	Mean	Descriptive Interpretation
1. The script does not contain any conceptual errors.	5.00	VHV
2. The script does not contain factual errors.	5.00	VHV
3. The script does not contain grammatical errors.	4.80	
4. The script does not contain computational errors.	5.00	VHV
5. The script does not contain obsolete information.	4.80	VHV
6. The script does not contain any typographical, technical, and other type of errors.	4.60	VHV
Composite Mean	4.87	VHV

Legend

Range of Means	Descriptive Interpretation
4.51-5.00	Very Highly Valid (VHV)
3.51-4.50	Highly Valid (HV)
2.51-3.50	Moderately Valid (MV)
2.00-2.50	Slightly Valid (SV)
1.00-1.50	Not Valid (NV)

Panel of Experts' Evaluation on the Content Validity of the Creative Educational Dance Videos in Mathematics 2 in Terms of Language

Table 3c shows the evaluation done by the panel of experts along the language of the material obtained with a weighted mean of 4.80 to 5.00 with a descriptive interpretation of Very Highly Valid.

Furthermore, it has a composite mean of 4.87 is described as Very Highly Valid, which indicates that the material used appropriate language, including vocabulary, sentences, paragraph, transitional devices or words, and the logical presentation of ideas, instructions and activities.

Brame (2015) [18] cited that the use of conversational rather than formal language during multimedia instruction has been shown to have a large effect on students' learning. A conversational style encourages students to develop sense of social partnership with the narrator that leads to greater engagement and effort.

Table 3c: Panel of experts' evaluation of the Creative Educational Dance Videos in Mathematics 2 in terms of language. (n=5)

Indicator	Mean	Descriptive Interpretation
1. The language used is informal and conversational.	5.00	VHV
2. The vocabulary level and words are within the level of the learner's experience and understanding.	5.00	VHV
3. The sentences and paragraph structures are brief, simple, varied, and appropriate to the target learners.	4.80	VHV
4. There is logical and smooth flow of ideas within a topic/lesson.	4.80	VHV
5. Transition devices/words are properly provided.	4.80	VHV
6. Instructions, exercises, questions, and activities and understandable and clear to the learner.	4.80	VHV
Composite Mean	4.87	VHV

< 190 >

Legend

Range of Means	Descriptive Interpretation
4.51-5.00	Very Highly Valid (VHV)
3.51-4.50	Highly Valid (HV)
2.51-3.50	Moderately Valid (MV)
2.00-2.50	Slightly Valid (SV)
1.00-1.50	Not Valid (NV)

Panel of Experts' Evaluation on the Content Validity of the Creative Educational Dance Videos in Mathematics 2 in Terms of Technical Design

The data presented in Table 3d reveals the favorable response of the validators to the various indicators along the technical design of the material as shown by the computed mean ratings of 4.20 to 5.00 with the descriptive interpretation of Very Highly Valid.

Moreover, it has a composite mean rating of 4.80 described as Very Highly Valid. It implies that in the making of the Creative Educational Videos, the use of sounds, visuals, pacing, and other technicalities were highly considered.

Bravo *et al*. (2011) previous research explored the results of the use of videos as an educational tool. The study showed that streaming videos as supporting learning material had a positive effect on students' perception regarding the enhancement of their learning motivation. It also emphasized that proper definition of content and amount of information delivered through supplemental video is an important task to solve. Duration of videos and methodologies of displaying them influence the effectiveness of learning and student satisfaction.

Table 3d: Panel of experts' evaluation of the Creative Educational Dance Videos in Mathematics 2 in terms of technical design. (n = 5)

Indicator	Mean	Descriptive Interpretation
1. The length of the video lesson is within prescribed running time.	5.00	VHV
2. Rules on acronyms, numbers, figures, and fractions are accurately and properly observed.	5.00	VHV
3. The video lesson is complete in elements/parts.	5.00	VHV
4. Audio components (i.e., narration, dialogue, music, and sound effects) are appropriate and effective for educational purposes.	4.80	VHV
5. Visual components (i.e., animations, images, and texts) are appropriate and effective for educational purposes.	4.60	VHV
6. Visual and audio components engage the interest of the learners and enhance the content script.	4.80	VHV
7. Integration of music and sound effects are coherently and smoothly applied.	4.80	VHV
8. The types of shots used are appropriate and relevant to the story.	4.80	VHV
9. The camera angles/movements are useful to the content.	4.20	VHV
10. There is variety and consistent use of camera angles and movements.	4.80	VHV
11. Volume and sound quality are smooth and well integrated.	4.80	VHV
12. Pacing is effective and appropriate to instructional purposes.	5.00	VHV
Composite Mean	4.80	VHV

Legend:

Range of Means	Descriptive Interpretation
4. 51-5.00	Very Highly Valid (VHV)
3.51-4.50	Highly Valid (HV)
2.51-3.50	Moderately Valid (MV)
1.51-2.50	Slightly Valid (SV)
1.00-1.50	Not Valid (NV)

Summary of Results of the Panel of Experts' Evaluation on the Content Validity of the Creative Educational Dance Videos in Mathematics 2

Table 3e presents the summary of results of the panel of experts' evaluation on the content validity of the Creative Educational Dance Videos in Mathematics 2 in terms of the four criteria.

Table 3e. Summary of Results of the Panel of Experts' Evaluation on the Content Validity of the Creative Educational Dance Videos in Mathematics 2. (n =5)

Indicator	Mean	Descriptive Interpretation
1. Instructional Design and Presentation and Organization	4.73	VHV
2. Accuracy and Timeliness of Information	4.87	VHV
3. Language	4.87	VHV
4. Technical Design	4.80	VHV
Composite Mean	4.82	VHV

Legend:

Range of Means	Descriptive Interpretation
4. 51-5.00	Very Highly Valid (VHV)
3.51-4.50	Highly Valid (HV)
2.51-3.50	Moderately Valid (MV)
1.51-2.50	Slightly Valid (SV)
1.00-1.50	Not Valid (NV)

It can be gleaned from table 3e that all the elements in the validation criteria obtained a descriptive interpretation of *Very Highly Valid* as shown by the computed mean rating which constitute the set of values ranging from 4.73 to 4.87. Furthermore, the overall weighted mean score of 4.82 described as *Very Highly Valid* confirms the validity of the material as a whole. Hence, the Creative Educational Dance

< 191 >

Videos in Mathematics 2 could improve the level of mastery of the learners on the different learning competencies.

To substantiate the data gathered from the validators' responses, the researcher sought comments and suggestions as follows: correct pronunciation of some words; and, the font should be century gothic or comic sans. These were taken constructively and were considered in the revision of the material.

Aside from such comments and suggestions, written testimonies of the evaluators to recognize the efforts of the material developer were highlighted. These include the following:

"The researcher had just an obra that really fits to the present need of delivering knowledge of content to the young learners. She just proved that amidst the pandemic, learning never ceased.

-Validator A

"The lessons on the videos are aligned with the competencies for Grade 2. The presentation is impressive, job well done!"

-Validator B

"*It is evident that the videos will surely catch the learner's attention especially on the dance part which help them to remember the lesson easily."*

-Validator C

"The materials serve as aides to help learners master the competencies and explore learning at their own pace.

-Validator D

"The teacher planned well the integration of dance into the lesson. This educational dance videos help to solicit learners' interest with the lesson."

-Validator E

Key Teachers' Evaluation on the Level of Acceptability of the Creative Educational Dance Videos in Mathematics 2 along Clarity

Table 4a shows the data gathered about the key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 in terms of clarity.

The data presented in Table 4a reveals the favourable response of the validators to the various indicators along the clarity of the material as shown by the computed weighted mean of 4. 76 to 4.90 with the same descriptive interpretation of *Very Highly Acceptable.*

Moreover, it has a composite mean rating of 4. 83 described as *Very Highly Acceptable.* This implies that Creative Educational Dance Videos focused on the use of clear and relevant details, concepts and procedures to do the activities in the dance videos.

Table 4a: Key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 in terms of clarity. (n = 21)

Indicator	Mean	Descriptive Interpretation
1. The material is easy to understand.	4.81	VHA
2. It utilizes clear, sharp and easy-to-understand concepts.	4.86	VHA
3. It offers relevant details to support each lesson.	4.76	VHA
4. It provides procedures as guidance in the conduct of activity.	4.90	VHA
Composite Mean	4.83	VHA

Legend

Range of Means	Descriptive Interpretation
4. 51-5.00	Very Highly Acceptable (VHA)
3.51-4.50	Highly Acceptable (HA)
2.51-3.50	Moderately Acceptable (MA)
1.51-2.50	Slightly Acceptable (SA)
1.00-1.50	Not Acceptable (NA)

Key Teachers' Evaluation on the Level of Acceptability of the Creative Educational Dance Videos in Mathematics 2 along Execution

Table 4b shows the data on the key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 along its execution.

The data presented above shows the evaluators' positive responses to the demonstrations moves of the Creative Educational Dance Videos in Mathematics 2 as manifested by the obtained weighted mean of 4.62 and 4.81 described as *Very Highly Acceptable.*

Table 4b: Key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 in terms of execution. (n = 21)

Indicator	Mean	Descriptive Interpretation
The Creative Educational Dance Videos 1. Presents and performs well the concept.	4.81	VHA
2. Demonstrates moves cleanly and clearly with dynamic finesse.	4.62	VHA
Composite Mean	4.72	VHA

< 192 >

Moreover, it has a composite mean of 4.72 described as *Very Highly Acceptable* which implies that the creative educational dance videos focused well on the dance steps presented and performed based on the concepts and dynamism movements.
Samat and Aziz (2020) claimed that multimedia learning can help pupils memorize and store the information in short-and long term memory and can recall them if needed.

Key Teachers' Evaluation on the Level of Acceptability of the Creative Educational Dance Videos in Mathematics 2 along Usefulness
Table 4c shows the data on the key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 in terms of usefulness.
The data presented in Table 4c reveals the favourable response of the validators to the various indicators along the technical design of the material as shown by the computed

weighted mean of 4.52 to 4.86 with the same descriptive interpretation of *Very Highly Acceptable.*
Moreover, it has a composite mean rating of 4.74 described as *Very Highly Acceptable* which implies that the creative educational dance videos focused on the effectiveness to support teachers and learners in the teaching and learning process.
Chioran (2016) [16] cited that multimedia learning tasks advantage of the brain's ability to make connections between verbal and visual representations of content, leading to a deeper understanding which in turn supports the transfer of learning to other situations. It proves that multimedia learning could take advantage the brain's ability to make connections between verbal and visual representations of content, leading to a deeper understanding, which in turn supports the transfer of learning to other situations. In addition, it also increases student attention and retention while it greatly impacts their mood during the learning process.
Moreover, multimedia learning benefits the students by participating more confident in class discussions and through this, they could explore and learn about places that they have never been to. Furthermore, multimedia learning has a direct effect on learning that differs and can't be achieved as easy whilst than the traditional education materials.

Table 4c: Key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 along usefulness (n = 21)

Indicator	Mean	Descriptive Interpretation
1. Upholds learners' needs by providing contextualized elements (e.g. people/characters, objects or materials) for each lesson.	4.86	VHA
2. Creates a more productive T-L Process for teachers and learners.	4.76	VHA
3. Permits the learners to explore the knowledge independently and by group.	4.52	VHA
4. Supports teachers with inadequate subject matter knowledge and teaching competencies.	4.81	VHA
Composite Mean	4.74	VHA

Key teachers' evaluation on the Level of Acceptability of the Creative Educational Dance Videos in Mathematics 2 along Language and Style
Table 4d shows the data on the key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 in terms of language and style.
The data presented in Table 4d reveals the favourable response of the validators to the various indicators along the technical design of the material as shown by the computed weighted mean of 4.71 and 4.81 with the same descriptive interpretation of *Very Highly Acceptable.*
Moreover, it has a composite mean rating of 4.76 described as *Very Highly Acceptable* suggests that the Creative Educational Dance Videos considered appropriate use of language in the output to introduce topics or provide literature on language.
This study supports what the United Stated Agency for International Development (2020) claimed that when students are required to learn in a language they don't understand, the results are poor learning outcomes in the early grades which

contribute to significant grade repetition and high dropout rates.

Table 4d: Key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 in terms of language and style. (n = 21)

Indicator	Mean	Descriptive Interpretation
1. Use appropriate motivational strategy to introduce a topic.	4.81	VHA
2. Employ appropriate language to fully understand the concept.	4.71	VHA
Composite Mean	4.76	VHA

Key teachers' evaluation on the Level of Acceptability of the Creative Educational Dance Videos in Mathematics 2 along Suitability
Table 4e shows the data on the key teachers' evaluation on

< 193 >

the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 in terms of suitability.

The data in the above table presents the favourable response of the respondents to the material regarding the different indicators as revealed by the computed mean scores which constitutes the set of values from 4. 62-4.86 with descriptive interpretation of *Very Highly Acceptable.*

Further, it has a composite mean of 4.73 described as *Very Highly Acceptable* implying that the educational dance videos considered the relevance and appropriateness to the learners' level of learning needs, opportunities, and interests.

McCarthy (2014) [32] explained when a topic connects to what students like to do, engagement deepens as they willingly spend time thinking, dialoguing, and creating ideas in meaningful ways.

Table 4e: Key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2 along Suitability. (n = 21)

Indicator	Mean	Descriptive Interpretation
The Creative Educational Dance Videos 1. Arouses and sustains the interest of the learners.	4.86	VHA
2. Provides relevant background knowledge to have a meaningful understanding of the content.	4.76	VHA
3. Sets appropriate tasks and level of difficulty which are based on learners' need.	4.67	VHA
4. Introduces real-life situations and learning opportunities that are reflected in the curriculum.	4.62	VHA
Composite Mean	4.73	VHA

Legend:

Range of Means	Descriptive Interpretation
4. 51-5.00	Very Highly Acceptable (VHA)
3.51-4.50	Highly Acceptable (HA)
2.51-3.50	Moderately Acceptable (MA)
1.51-2.50	Slightly Acceptable (SA)
1.00-1.50	Not Acceptable (NA)

Summary of Results on the Key Teachers' Evaluation on the Level of Acceptability of the Creative Educational Dance Videos in Mathematics 2

Table 4f shows the summary of results on key teachers' evaluation on the level of acceptability of the Creative Educational Dance Videos in Mathematics 2.

Table 4f: Summary of Results on the Key Teachers' Evaluation on the Level of Acceptability of the Creative Educational Dance Videos in Mathematics 2. (n = 21)

Criteria	Composite Mean	Descriptive Interpretation
Clarity	4.83	VHA
Execution	4.72	VHA
Usefulness	4.74	VHA
Language and Style	4.76	VHA
Suitability	4.73	VHA
Overall Mean	4.76	VHA

Legend:

Range of Means	Descriptive Interpretation
4. 51-5.00	Very Highly Acceptable (VHA)
3.51-4.50	Highly Acceptable (HA)
2.51-3.50	Moderately Acceptable (MA)
1.51-2.50	Slightly Acceptable (SA)
1.00-1.50	Not Acceptable (NA)

It can be gleaned from table 4f that all the elements included in the acceptability obtained a descriptive interpretation of *Very Highly Acceptable* shown by computed mean scores which constitutes the set of values from 4.72 to 4.83. Moreover, the overall weighted mean score of 4.76 shows that the Creative Educational Dance Videos in Mathematics 2 is *Very Highly Acceptable* for the learners as evaluated by Grade 2 teachers.

The results indicate that the material could be adopted as a curriculum support material to enhance mathematical learning, especially on the level of mastery on the different learning competencies.

Comments and suggestions were also sought among the evaluators and from the data gathered, the following testimonies were tallied:

The educational dance videos are amazing! It will surely catch the attention of the learners which will make them more engaging and feel that Math is fun and interesting.

-Evaluator 1

The videos are very appropriate to the learners, they can easily follow the steps and be able to understand the lesson too

-Evaluator 2

Awesome! It was a very entertaining and useful strategy for teachers in teaching their lessons in Mathematics. Indeed, creative educational dance videos really arouse the interest of the pupils. They will surely love learning at ease.

-Evaluator 3

The material is engaging. It provides opportunities to develop other skills like dancing. I think, using this material in developing concepts is helpful in the teaching learning process. The lesson becomes more meaningful to children.

-Evaluator 4

Using these educational dance videos in teaching Math is very recommendable. These videos will make them find that learning is fun in Math and it's not just learning the topic alone but to dance too.

-Evaluator 5

Conclusions

Based on the findings, the following conclusions were drawn: With the *nearly mastered* level of performance in Mathematics 2 as perceived by the teacher-respondents, the learners are equipped only with minimum understanding and core skills about whole numbers and their operations, measurements, geometry, and statistics. However, the results mean that they could advance their learning in Mathematics with the assistance from their teachers and parents with the aid of an appropriate curriculum support material. Hence, the Creative Dance Videos in Mathematics 2 were developed to enhance mastery of concepts, critical thinking, and problem solving skills of the learners.

Based on the evaluation of experts and key teachers, the output of this study were found *very highly valid* and *very highly acceptable*; thus, the Creative Dance Videos could be adopted as part of the curriculum to provide meaningful learning experiences among learners to master their skills and content knowledge in Mathematics.

< 194 >

As indicated by the above findings, this study expounded further the application of the Instructional Design-ADDIE Model and E-Learning Theory with the production of the Creative Dance Videos in Mathematics 2 as a technology-based curriculum support material. It also confirmed Dale's Cone of Experiences and Constructivism theories with the ideas that mastery of skills and content knowledge could be enhanced with the use of audio-visual materials and active participation of learners, which could be evident from constant use of the Creative Dance Videos.

References
1. Fernández F, Marinez Abadia J. *Manual básico de lenguaje y narrative audiovisua*l. Barcelona: Ediciones Paidós Ibérica, SA, 2010.
2. Hovland CI, Lumsdaine AA. Experiments on mass communication. Princeton University Press, 2017.
3. Wasilewska K. Mathematics in the World of Dance. Bridges, 2012, 453-456.
4. Acharya BR. Factors affecting difficulties in learning mathematics by mathematics learners. *International Journal for Elementary Education.* 2017; 6(2):8-15.
5. Louange J *et al*. The relationship between the number sense and problem solving abilities of year 7 students. *Mathematics Education Research Group of Australia, Inc.* 2010; 33:376-382
6. Phonapichat P *et al*. An analysis of elementary school students' difficulties in mathematical problem solving. *Procedia-Social and Behavioral Sciences.* 2014; 116:3169-3174
7. Tichenor M, Piechura-Couture KJ, Heins E. Movement in the classroom: It's good for the brain. *New Teacher Advocate.* 2017; 25(1):2-3.
8. Adipo A. "*Impact of Instructional Materials on Academic Achievement in Mathematics*". University of Nairobi, 2015.
9. Anggraini DM. *The development of interactive media on theme energy saving at fourth grade student in Islamic Global School* (Doctoral dissertation, Universitas Islam Negeri Maulana Malik Ibrahim), 2015.
10. Bacnat H. Supplementary Workbook in Mathematics 2. (Unpublished Master's Thesis), Divine Word College of Laoag, 2020.
11. Ballesteros RJG. Educational Video Ventures (EVV) for Kindergarten Learners. (Unpublished Master's Thesis), Divine Word College of Laoag, 2021.
12. Bartolome JCS. A Self-Learning Kit in Improving the Mathematical Problem Solving Skills of Grade Six Pupils. (Unpublished Master's Thesis), Divine Word College of Laoag, 2019.
13. Mbugua ZK, Kibet K, Muthaa GM, Nkonke GR. Factors contributing to students' poor performance in mathematics at Kenya certificate of secondary education in Kenya: A case of Baringo country, Kenya, 2012.
14. Visitacion M. Competency-Based Activities in Mathematics Using the Mother Tongue for Grade 1. (Unpublished Master's Thesis), Divine Word College of Laoag, 2017.
15. Ali A. Why students find difficulty in math's problem solving, 2019. https://medium.com/@iranaahsanali/why-students-find-difficulty-in-maths-problem-solving-69ef827807d9
16. Baclig CE. PH's Grade 4 students lowest in math, science around the world-int'l study, 2020. http://newsinfo.inquirer.net/1370289/phs-grade-4-students-lowest-in-math-science-aroud-the-world-study
17. Blömeke S, Delaney S. Assessment of teacher knowledge across countries: A review of the state of research. *International perspectives on teacher knowledge, beliefs, and opportunities to learn*. Springer, Dordrecht, 2014, 541-585.
18. Brame C. Effective educational videos, 2015. Retrieved on August 27, 2020 from https:cft.vanderbilt.edu/guides-sub-pages/effective-educational-videos/
19. Bravo E, Amante B, Simon P, Enache M, Fernandez V. Video as a new teaching tool to increase student motivation. In *2011 IEEE global engineering education conference (EDUCON),* 2011, 638-642).
20. Brown, L. Benefits for teacher using video in the classroom, 2020. URL: https://filmora.wondershare.com/video-editing-tips/benefits-for-using-video-in-classroom.html.
21. Chioran A. 5 benefits of multimedia learing, 2016. https://www.nuiteq.com/company/blog/5-benefits-of-multimedia-learning
22. Colgan L. Making math children will love: Building positive mathitudes to improve student achievement in Mathematics. *Research into practice, Research Monograph,* 2014.
23. Corporation for Public Broadcasting. *Study of School Uses of Television and Video. 1996-1997 School year summary report.* ERIC Document Reproduction Service No. ED, 2010, 413-879.
24. Corporation for Public Broadcasting. *Television goes to school: The impact of video on student learning in formal education,* 2014. Retrieved from http://www.cpb.org/stations/reports/tvgoestoschool/
25. DepEd, K to 12 Curriculum Guide in Mathematics, 2016.
26. Duvall K. Dancing Through Curricula: Integratimg Dance into Elementary Classrooms, 2018.
27. DepEd Commons. Guidelines on the Use of The Most Essential Learning Competencies (MELCs), 2020.
28. Department of Education Guidelines and Processes for LRMDS Assessment
29. Edsys. 10 Reasons Why Students Fail Mathematics-Edsys Mathematics, 2018. https://www.edsys.in/10-reasons-students-fail-mathematics/
30. Gonzales E. YEAR-END REPORT: DepEd in 2019. 2019. The quest for quality education continues. Retrieved from https://mb.com.ph/2019/12/29/year-end-report-deped-in-2019-the-quest-for-quality.education-continues/
31. Kurucz Paul. The success orientations model, Success Orientations Publishing (http://successorientations.com), 2014.
32. McCarthy J. Learner Interest Matters: Strategies for Empowering Student Choice, 2014. https://www.edutopia.org/blog/differentiated-instruction-learner-interest-matters-john-mccarthy.
33. Redman LL. Creative movement and dance integration: Their connection to learning third grade math concepts, 2016.
34. United States Agency International Development. The Importance of Language Instruction, 2020. https://www.edu-links.org/learning/importance-language-instruction

< 195 >